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[CED 9: Timber and Timber Stores]

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Indian Standard
SPECIFICATION FOR WOOD WOOL FOR GENERAL PACKAGING PURPOSES
(First Revision)

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Indian Standard

SPECIFICATION FOR WOOD WOOL FOR GENERAL PACKAGING PURPOSES

(*First Revision*)

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Indian Standard

SPECIFICATION FOR WOOD WOOL FOR GENERAL PACKAGING PURPOSES

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 18 June 1979, after the draft finalized by the Wood Products Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Wood wool consists of thin pliable narrow strips of wood. It provides a loose cushioning suitable for nesting individual stores of interposing between and around a number of stores, where its moisture retaining and other contaminating properties are tolerable, for example, in the packing of ceramics and glassware. It may also be employed as a 'filling' or 'floating' medium where the danger from moisture and other contamination cannot be harmful, for example, between an inner container (having optical, scientific, range-finding instruments, etc) and an outer container.

0.2.1 The amount of cushioning provided by wood wool is an important factor to be determined. The methods of tests to estimate this property are included in this version.

0.3 In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

---

*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard covers the essential requirements of wood wool for general packaging purposes, for example, for the packing of machinery and other engineering equipment, furniture, glassware and ceramics.

2. TIMBERS SUITABLE FOR WOOD WOOL

2.1 Wood wool shall be manufactured from coniferous timbers only. The following species of timber have been found to be suitable:

Standard Trade Name	*Botanical Name*	*Abbreviated Symbols*
Chir	*Pinus roxburghii* (Syn. P. LONGIFOLIA)	CHR
Cypress	*Cupressus torulosa*	CYP
Deodar	*Cedrus deodara*	DEO
Fir	*Abies* spp.	FIR
Kail	*Pinus wallichiana* (Syn. P. EXCELSA)	BPI
Spruce	*Picea smithiana* (Syn. P. MORINDA)	SPR

2.1.1 Timber used for the manufacture of wood wool shall be thoroughly sound and adequately dry. It shall be free, as far as practicable, from knots and cross grain.

3. REQUIREMENTS

3.1 General — Wood wool shall be in the form of a knit mass of tangled strands and shall be clean and free from foreign matter and dirt.

3.2 Dimensions of Strands

3.2.1 The dimensions of individual strands of wood wool shall be as follows:

a) Width	Not less than 1·5 mm and not more than 3 mm
b) Thickness	Not more than 0·33 mm
c) Length	Not less than 250 mm in at least 75 percent of the supply. Strands less than 125 mm in length shall not exceed 10 percent including dust and small pieces under 25 mm (*see* **3.2.2**)

3.2.2 *Dust and Small Pieces* — When the wood wool is examined at the manufacturer's premises by the method described in Appendix A, the amount of dust and small pieces under 25 mm in length in each bale shall not exceed 5 percent of the total weight of the bale.

4. SAMPLING

4.1 Scale of Sampling

4.1.1 *Lot* — In any consignment all the bales of wood wool produced from the same species of timber and under identical conditions of manufacture shall be grouped together to constitute a lot.

4.1.2 The number of bales to be selected from a lot shall depend upon the size of the lot and shall be in accordance with Col 1 and 2 of Table 1.

TABLE 1 SCALE OF SAMPLING

LOT SIZE N (1)	NUMBER OF BALES TO BE SELECTED n (2)
Up to 50	2
51 to 150	3
151 and above	5

4.1.3 These bales shall be selected at random from the lot. In order to ensure randomness, all the bales in the lot may be arranged in a serial order and starting from any random bale, every rth bale may be included in the sample, r being the integral part of $\frac{N}{n}$,

where

N = lot size, and

n = number of bales to be selected.

4.1.3.1 For other methods of ensuring randomness in selection of bales from a lot, IS : 4905-1968* may be referred to.

4.1.4 From each bale so selected, one sample of wood wool of about 720 g shall be obtained by mixing together equal quantities from the centre and each end.

4.2 Number of Tests

4.2.1 All the samples obtained as in **4.1.4** shall be tested for the requirements as given under **3** and **5**.

4.3 Criterion for Conformity — A lot shall be considered as conforming to the requirements of this standard if all the samples selected from it satisfy the various test requirements.

---

*Methods for random sampling.

5. TESTS

5.1 Moisture Content — The moisture content of wood wool, when determined by the method described in Appendix B, shall not be less than 5 percent and not more than 15 percent at the time of inspection.

NOTE — As the moisture content of wood wool is liable to change with changes in atmospheric conditions, it is emphasized that the term ' at the time of inspection ' applies to the time when the wood wool is accepted by the inspecting officer or his representative.

5.2 *p*H Value — Where required by the purchaser at the time of placing the order, the *p*H value of the water extract determined by the method described in Appendix C shall not be less than 4·5 and not more than 8·0.

5.3 Resistance to Fracture — Individual strands of wood wool, 150 mm long, conditioned to a constant mass at 65 ± 5 percent RH and 27 ± 2°C temperature shall not fracture when wound around a 12 mm diameter rod or when given at least three complete twists by holding one end in one hand and twisting the other end.

5.4 Tests for Estimating Cushioning Characteristics

5.4.1 *Compressibility Test* — Wood wool sample as obtained in **4.1.4** shall be tested as described in Appendix D. The load required to compress the wood wool up to 1/2 of the volume shall not be more than 70 kg and the residual compression after removal of load shall not be more than 60 percent of the total compression.

5.4.2 *Shock Absorption Test* — Wood wool sample as obtained in **4.1.4** shall be tested as described in Appendix E. The rebound shall not be more than 10 percent of the height of drop.

6. PACKING

6.1 Wood wool shall be packed in bales of 25 kg or 50 kg each; the stated weight shall be the net weight exclusive of battens and similar accessories used for packing purposes.

7. MARKING

7.1 Each bale of wood wool shall be legibly and indelibly marked (stamped or stencilled) with the following particulars along with such other information as the purchaser may stipulate at the time of placing an order:

a) Manufacturer's name, initials or recognized trade-mark;

b) Year of manufacture;

c) Net weight of wood wool in kg; and

d) The words ' WOOD WOOL '.

7.1.1 Each bale of wood wool may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

APPENDIX A

(*Clause* 3.2.2)

DETERMINATION OF DUST AND SMALL PIECES

A-1. From the resultant mass as chosen under **4.1.4**, take about 400 g of wood wool, shake it in a bag and spread out on a clean surface. Examine visually and gravimetrically for dust and small pieces.

APPENDIX B

(*Clause* 5.1)

DETERMINATION OF MOISTURE CONTENT

B-1. A small sample of about 10 g, taken from the mass as chosen under **4.1.4**, shall be placed immediately in a tared metal or glass weighing container having a tightly fitting cover. A separate weighing container shall be used for each sample taken. The sample and its container shall then be weighed to the nearest 0·01 g. The cover shall remain tightly fitted until the weighing is completed. The cover is then removed and the container with sample inside shall be placed in an oven at a temperature of 100 to 105°C for 24 hours or until the mass is constant (W_0). Each time the container is removed from the oven for weighing, the cover shall be put securely in place.

B-2. The moisture content shall be calculated as follows:

$$\text{Percentage of moisture} = \frac{W_1 - W_0}{W_0} \times 100$$

where

W_1 = mass of the sample before drying, and

W_0 = oven-dry mass of the sample.

B-3. Care shall be taken to prevent any change in moisture content between the sampling and the first weighing and also between removal from the oven and the subsequent weighing.

APPENDIX C

(*Clause* 5.2)

DETERMINATION OF *p*H VALUE

C-1. Take a small sample of 10 g, from the resulting mass as chosen under **4.1.4**, add 400 ml boiling distilled water and stir thoroughly. Allow to stand for about 18 hours, taking suitable precautions against contamination by atmospheric impurities. Stir thoroughly and allow to stand further for an hour. Decant off 200 ml of the solution (filtering, if necessary, through a dry sintered glass filter and rejecting the first 25 ml of the filtrate) and determine the *p*H value by any suitable standard method.

C-2. Simultaneously, run a blank test for checking the accuracy of the method adopted.

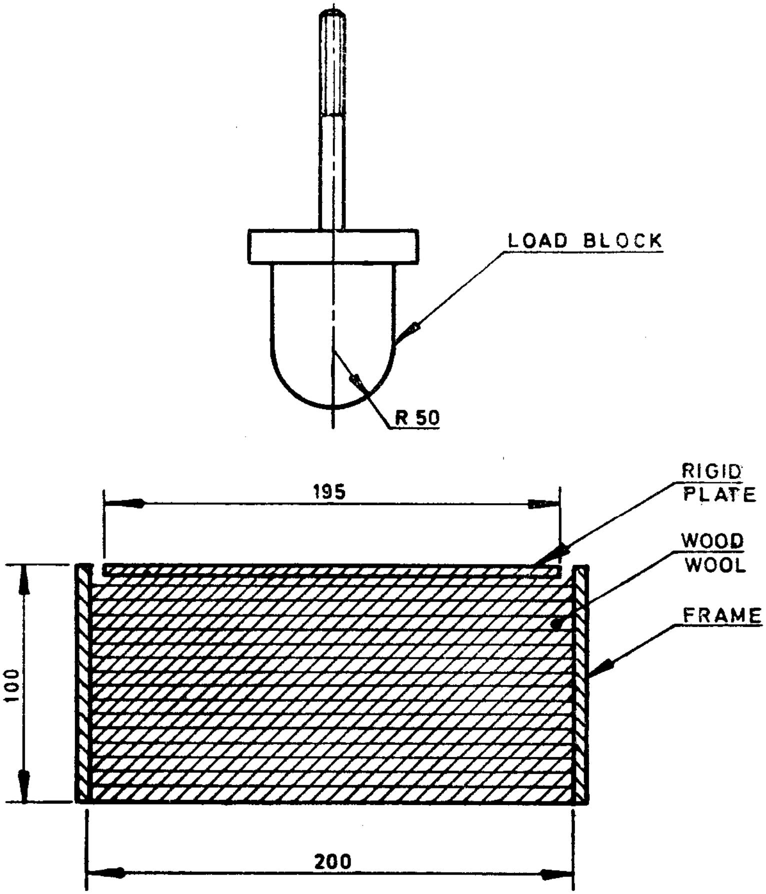
APPENDIX D

(*Clause* 5.4.1)

COMPRESSIBILITY TEST

D-1. PROCEDURE

D-1.1 From the sample of wood wool obtained as in **4.1.4**, 150 g wood wool strands shall be taken and conditioned at 65 ± 5 percent RH and 27 ± 2°C temperature. The conditioned sample shall be filled in a frame of 200 × 200 × 100 mm in size in a manner as to simulate the general compactness in packaging. The frame shall be kept on the platform of a universal testing machine. A rigid plate of 195 × 195 mm in cross section shall be placed over the wood wool. The load shall be applied by means of hemispherical loading block of radius 50 mm (*see* Fig. 1) at the centre of the plate with a continuous and uniform rate of motion of moving head equal to 2 mm per minute and compression shall be noted correct to 0·1 mm by means of a scale fixed on the loading block. The test shall be continued till 50 mm compression (that is, wood wool is compressed to half of its volume) is reached. For this compression the required load shall be recorded. The load shall then be removed and the residual compression shall also be recorded.



All dimensions in millimetres.

FIG. 1 COMPRESSIBILITY TEST OF WOOD WOOL

D-2. The load required to compress the wood wool to half of its volume and residual compression immediately after the removal of the load shall comply with the requirements of **5.4.1**.

APPENDIX E

(*Clause* 5.4.2)

SHOCK ABSORPTION TEST

E-1. PROCEDURE

E-1.1 From the sample of wood wool obtained in **4.1.4**, 150 g wood wool strands shall be taken and conditioned at 65 ± 5 percent relative humidity and 27 ± 2°C temperature. The conditioned sample shall be completely and uniformly filled in a frame of 200 × 200 × 100 mm in size and a rigid plate of 195 × 195 mm in cross section shall be kept over the wood wool. A cubical block of 100 × 100 × 100 mm shall be fixed on one end of a rod. The rod shall be square in cross section and graduated in centimetres as shown in Fig. 2. The total weight of the block with rod shall be 1 kg. The cubical block with rod shall be dropped 10 times on the centre of the plate from a height of 75 cm with the help of suitable guides. The rebound of the rod shall be read at any convenient horizontal position by means of the guide at each drop.

E-1.2 The rebound shall not be more than 75 mm (that is, 10 percent of the height of drop) in all the 10 drops.

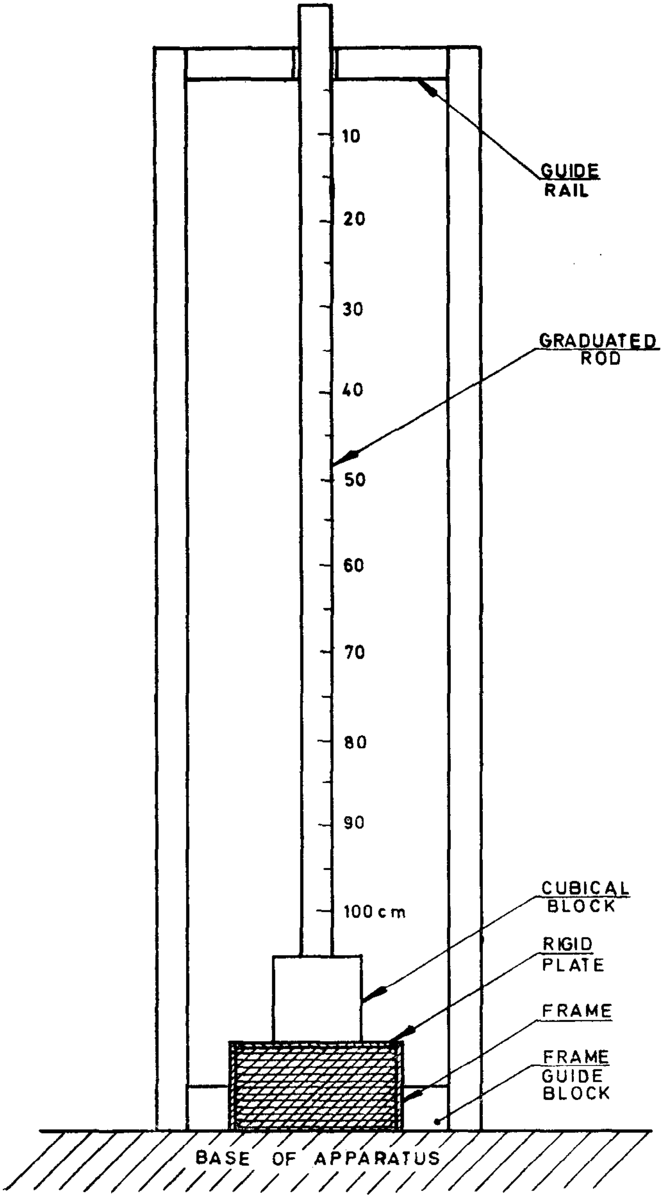


FIG. 2 SHOCK ABSORBING TEST OF WOOD WOOL

INDIAN STANDARDS ON BOARDS

IS:	
1658-1977	Fibre hardboards (*second revision*)
1659-1969	Block boards (*first revision*)
2380 (Parts I to XXI)-1977	Methods of test for wood particle boards and boards from other lignocellulosic materials (*first revision*)
3087-1965	Wood particle boards (medium density) for general purposes
3097-1965	Veneered particle boards
3129-1965	Particle boards for insulation purposes
3308-1969	Wood wool building slabs
3348-1965	Fibre insulation boards
3478-1966	High density wood particle boards

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	$1\ \mathrm{N} = 1\ \mathrm{kg.m/s^2}$
Energy	joule	J	$1\ \mathrm{J} = 1\ \mathrm{N.m}$
Power	watt	W	$1\ \mathrm{W} = 1\ \mathrm{J/s}$
Flux	weber	Wb	$1\ \mathrm{Wb} = 1\ \mathrm{V.s}$
Flux density	tesla	T	$1\ \mathrm{T} = 1\ \mathrm{Wb/m^2}$
Frequency	hertz	Hz	$1\ \mathrm{Hz} = 1\ \mathrm{c/s}\ (\mathrm{s^{-1}})$
Electric conductance	siemens	S	$1\ \mathrm{S} = 1\ \mathrm{A/V}$
Electromotive force	volt	V	$1\ \mathrm{V} = 1\ \mathrm{W/A}$
Pressure, stress	pascal	Pa	$1\ \mathrm{Pa} = 1\ \mathrm{N/m^2}$

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